

Maritime Security and Security Measures – Mimic Study in the Baltic Sea Area

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ABSTRACT

This report is a part of the project “Minimizing Risks of Maritime Oil Transport by Holistic Safety Strategies” (MIMIC) work package 3. Work package 3 (WP3) is concentrated on maritime security issues, especially the identification of security threats and evaluation of security risks in the Baltic Sea area. In the previous phases of WP3, literature review was published on general security issues in 2012 and a report of the results of an interview and survey study was published in 2013.

This report is a continuation to the previous reports. In this report, the general views on maritime security are examined, and the most essential measures for security threats from MIMIC WP3’s perspective are introduced. Material for this study has been collected by means of theme interviews, web-based survey, Delphi study and workshops.

At the moment, the Baltic Sea region is a relatively stable, peaceful and controlled area. However, based on the results of the study, it seems the security threats, such as smuggling of weapons or drugs, thefts, vandalism, human trafficking and smuggling, violent crimes, illegal fishing, illegal discharge and illegal environmental activism occur in the Baltic Sea region. Still, the prevalence for the most of these threats is low. Smuggling of drugs and weapons and human trafficking in the Baltic Sea are problems that should be noticed.

In conclusion, the situational awareness and national and international co-operation between the authorities and other actors seem to greatly contribute to the overall security. Situation awareness and co-operation help the Baltic Sea states to better prepare for security threats, existing as well as potential ones, and thus guarantee a safe living environment for the people in the Baltic Sea region.

TIIVISTELMÄ

Raportti liittyy ”Minimizing risks of maritime oil transport by holistic safety strategies” (MIMIC) – projektin työpaketti kolmeen, joka keskittyy merenkulun turvauhkien (security) tunnistamiseen ja riskien arvioimiseen Itämeren alueella. MIMIC -projektissa on aikaisemmin julkaistu kirjallisuuskatsaus (2012) sekä haastattelu- ja kyselytutkimuksen tuloksia käsittelevä raportti (2013).

Tämä raportti on jatkoa tutkimuksen aikaisemmille raporteille ja tässä raportissa käsitellään yleisiä näkökulmia merenkulun turvauhkiin, esitellään MIMIC –projektin työpaketin 3 tutkimuksen perusteella tärkeimmät merenkulun turvauhkien (security) hallintakeinot. Tutkimuksessa tiedonkeruumenetelminä on käytetty haastattelu-, kysely- ja Delfoi-tutkimusta sekä asiantuntijoiden työpajoja.

Itämeren alue on tällä hetkellä melko vakaa, rauhallinen ja valvottu alue. Kuitenkin tutkimuksen tulosten perusteella voidaan sanoa, että turvauhkia, kuten aseiden salakuljetusta, huumeiden salakuljetusta, varkauksia, ilkivaltaa, ihmiskauppaa ja ihmisten salakuljetusta, väkivaltarikoksia, laitonta kalastusta, laittomia päästöjä ja laitonta ympäristöaktivismia, esiintyy Itämeren alueella. Suurimaksi osaksi näiden uhkien esiintyvyys on kuitenkin vähäistä. Huomioitavia ongelmia Itämeren alueella ovat huumeiden ja aseiden salakuljetus sekä ihmiskauppa.

Johtopäätöksenä voidaan sanoa, että tilannekuvan havainnollistaminen ja kansallinen ja kansainvälinen yhteistyö viranomaisten ja muiden toimijoiden kesken on erittäin tärkeää merenkulun kokonaisturvallisuuden kannalta. Tilannetietoisuuden ja yhteistyön avulla Itämeren jäsenvaltioilla on valmiudet varautua turvauhkiin, niin olemassa oleviin kuin mahdollisiin uusiin uhkiin ja näin taata Itämeren alueen ihmisille turvallinen elinympäristö.

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ABBREVIATIONS

AEO	EU Authorized Economic Operator
AIS	Automatic Identification System
CBSS	Council of Baltic Sea States
C-PAT	Customs Trade Partnerships Against Terrorism
CSI	Container Security Initiative
IMO	International Maritime Organization
ISPS Code	International Code for the Security of Ships and Port Facilities
LRIT	Long Range Identification and Tracking system
MSCA	Maritime Security Co-operation and Awareness
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
Trafi	Finnish Transport Safety Agency
VTT	Technical Research Centre of Finland

I INTRODUCTION

I.1 Background

The Baltic Sea connects the Baltic Sea states to Continental Europe and the rest of the world, and it is a key transportation route. Maritime transport is of vital importance for Baltic Sea states. Especially, it is a crucial transport mode for Finland and Sweden and the most important mode for Denmark and Russia. (Breitzmann, 2013.)

The Baltic Sea is one of the world's busiest seas; vessel traffic has increased dramatically in recent years although the present economical regression has restricted it. A "motor for the increase" is mainly Russia. For example, nearly 60 percent of the tanker transport is Russian export. All types of cargoes can be found in the Baltic Sea, of which liquid goods present the highest transport volumes. Container shipping has been the most rapidly increased form of transport during the last years (Breitzmann, 2013).

The area has been peaceful and stable, but on the other hand it has now also become an important area in terms of political importance and security, and the Baltic Sea is not excluded from the developments and trends of the global security. The occurrence of obstacles to seafaring in the Baltic Sea area could cause significant problems for the states' maintenance and supply security. The sea area is also heavily polluted and cannot withstand any extra load from the possible shipping accidents. When planning matters related to safety and security must be taken into account more and more all the factors that threaten the safety and security; not only on the human factor or accidents causing natural damages, but also on the threats caused by illegal and intentional acts.

I.2 The purpose and structure of the report

This report is a part of work package 3 of the project "*Minimizing risks of maritime oil transport by holistic safety strategies*" (MIMIC) whose main focus is on maritime security, especially threat

identification and risk assessment in the Baltic Sea area (more about MIMIC on appendix 1). The main objective of this report is to present the phases of the MIMIC project WP 3 and combine and discuss the results of the studies. Also, the purpose is to present the security measures that according to the authorities and experts were the most essential when managing security issues in the Baltic Sea region.

The material for this study was collected by different ways: theme interviews, web-based survey, Delphi study and workshops. The results of the previous phases of this study (literature review, interviews, web-based survey) were presented in reports which were published in 2012 and 2013. The current report will present the results of Delphi survey and security threat analysis model for MIMIC by VTT.

This report contains seven chapters. Chapter 1 presents some background information and specifies the purpose, limitations and definitions of the report. Chapter 2 outlines the general aspects on maritime security and special security factors in the Baltic Sea region. Chapter 3 describes how the material was collected and how the study was implemented (Delphi survey, interviews and survey and workshops). In chapter 4, the mapping of security threats is presented, and the results of the study are discussed. Chapter 5 contains the presentation of an analysis model for Mimic, and chapter 6 introduces the maritime security measures which are based on the results of the Delphi study. The conclusions are presented at the end of the report.

1.3 Limitations and definitions

In this chapter, the limitations to and essential definitions used in the study will be presented.

Limitations. The study of WP 3 is concentrated on maritime security in the Baltic Sea area, particularly the focus is on Finland. For this study, the security threats were divided into nine categories: destruction of the marine environment (illegal pollution and emissions), illegal fishing, smuggling and trafficking of illicit drugs, smuggling and trafficking of weapons, human smuggling and trafficking, piracy, terrorism, environmental activist, vandalism and theft. More information about the threats can be found in the reports “*Maritime safety and security -Literature review*” by Fransas, Nieminen, Salokorpi & Rytönen, 2012, and “*Maritime Security and safety threats – Study in the Baltic Area*” by Fransas, Nieminen, Salokorpi, 2013.

Definitions. Del Pozo, Dymock, Feldt, Hebrard and Monteforte (2010, 45-46) define maritime security and safety as follows:

Security: “*The combination of preventive and responsive measures to protect the maritime domain against threats and intentional unlawful acts.*”

Safety: “*The combination of preventive measures intended to protect the maritime domain against, and limit the effect of accidental or natural danger, harms, damage to environment, risk or loss.*”

The concept of threat has been defined by Criminal Intelligence Service Canada (2007, 27) as follows:

“Threat is based on a group’s (or subject’s) intent and capability and is a measure of how likely the success in carrying out some activity that may cause harm.”

Criminal Intelligence Service Canada (2007, 25) defined the risk as follows:

“Risk refers to the uncertainty that future events and outcomes. It is measured in terms of likelihood and harm (consequences) of an event with the potential to influence the achievement of an important objective.”

2 MARITIME SECURITY IN THE BALTIC SEA REGION

First in this chapter, some general security aspects are examined followed by a discussion of security factors in the Baltic Sea region.

2.1 Security aspects

Maritime safety and security is managed by a number of international and national laws, regulations, and guidelines (Reinman, Silla, Heikkilä, Pietikäinen & Luoma 2012, 16). Security and safety differ from each other by the issue of willfulness of the act. Deliberate malignity acts are regarded as security issues. According to Mallia (2010, 1): *“Maritime security is understood to include the preservation of territorial integrity and sovereignty, and the maintenance of peace and order, so as to ensure the safety and protection of ships together their passengers, crews and cargoes, and the protection of property and the environment”*.

Maritime security at sea continues to be threatened in many ways, for example the movement of terrorists and their means of financing, and the shipment of weapons of mass destruction and conventional arms, the smuggling of drugs and migrants, piracy and armed robbery at sea (Roach 2004, 41). When criminal activity is concerned, all threats to maritime security have one remarkable mutual feature: the transnational link. Criminal organizations are able to operate globally due to the fact that it is considerably easy to cross borders and a majority of legislative instruments and resources are limited by state boundaries. New existing transnational threats are being recognized, and these challenges have highlighted the value of international cooperation in ensuring maritime security and the need for a coordinated approach. (Mallia 2010, 1.)

2.2 Security factors in the Baltic Sea region

Because security is a complex matter, the Baltic Sea region has its advantages and challenges but still it might be a good example on how security cooperation between countries can develop in

the time of peace and stability. Between the Nordic countries, cooperation related to security has a long tradition although the security preferences have often been different. (Mölder 2006, 8, 27.)

Along with the interdependence of the global growth, the countries' external and internal security has become increasingly interconnected. The threats that cross borders such as terrorism, drug and human trafficking, infectious diseases, environmental threats, energy outages and cyber-attacks are emphasized. Increasingly, the Baltic countries prepare for disruptions by international cooperation. (Valtioneuvoston kanslia 2012, 23.)

Mölder, H. writes in the article "NATO's Role in the Post-Modern European Security Environment, Cooperative Security and the Experience of the Baltic Sea Region" (2006, 26) that *"the advantage of the Baltic Sea region is that the region has traditionally been peaceful. Wars between Baltic Sea states have been rare during the last centuries. Today, there are only some potential conflict areas, but lesser predictability for the emergence of violence. The possible threats for the region include mostly asymmetrical threats like environmental issues, economic issues, migration, etc."*

A well-established co-operation in the Baltic Sea region, in particular the Council of Baltic Sea States (CBSS) framework, benefits the environment, the economy, transport, research and other sectors of society. Baltic coastal states have a common interest in keeping the transport route open, free of accidents, clean and functional. This supports the stability of the region. (Valtioneuvoston kanslia, 2012, 64.)

3 COLLECTION OF MATERIAL AND IMPLEMENTATION OF THE STUDY

In the research of work package 3, empirical materials on maritime security threats were collected by means of theme interviews, web-based survey, Delphi survey and workshops. In this chapter, the phases of the material collection are presented.

3.1 Interviews and survey

Information on security threats were collected by expert interviews and an electronic survey. The implementation of the interviews and the survey are discussed in this chapter.

Interviews. The expert interviews were executed between December 2011 and September 2012. 15 experts from 13 different organizations took part in the interviews. These experts represented ports, shipping companies, marine authorities, and other experts (fields such as education or scientific research).

The threat categories formed a base for the interviews and also served as a model for the interview form. The interview form was divided into nine main threat categories and their subgroups: destruction of the marine environment, illegal fishing, smuggling, stowaways, piracy, terrorism, environmental activism, vandalism, and theft.

The aim of the interviews was to identify the nature of each threat and the potential place for the threat to occur, and to complete a risk analysis for security and safety matters. Also, the interviews aimed to distinguish between potential and occurred threat scenarios.

Survey. The web-based survey was executed in the Baltic Sea countries in the autumn of 2012. The threat categories used in the interviews served as the base of the survey. The main categories in the survey were intentional pollution, illegal emission, illegal fishing, smuggling, stowaways, piracy, terrorism, illegal environmental activism, vandalism, pilferage and homicide. The survey was sent to 44 people with expertise in maritime related matters in the Baltic Sea countries but only seven answers were received. The respondents were from Estonia, Germany, Finland and Sweden.

3.2 Delphi study

Delphi technique has been defined in many ways. Linstone and Turoff (1975, 3) defined Delphi method as follows: *“Delphi may be characterized as a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem”*.

The Delphi technique was initially intended to produce a consensus of opinions among experts with successive questionnaires and controlled feedback. (Kuusi 2003, 207). According to Wouldenberg (1991, 133) the characteristics of Delphi are anonymity, iteration and feedback.

Implementation. The Delphi survey was conducted at the beginning of 2013 with a network program developed by Otavan opisto (Finnish academy) which was planned to utilize the Delphi expert method. The Delphi was focused on maritime security threats, maritime security measures, and other security-related factors of the Baltic Sea area.

In Delphi survey, a group of experts is called a panel. For this particular survey, eleven experts from Finland representing different organizations were selected to the panel. The panelists included authorities, representatives of educational, port and shipping organizations as well as other experts in the field. The panelists constituted a versatile and also an experienced group of experts.

The Delphi study consisted of three rounds. The aim of the first round was to clarify the interpretations of the expert interviews. Two different sections were included in the first round. First, the panelists were asked to map the threats and give their evaluations of the impact and likelihood of the threats in the Baltic Sea area. The list of threats consisted of destroying the marine environment/illegal discharges into the sea, illegal fishing, drug smuggling, smugglings of weapons, equipment and components, human smuggling, human trafficking, piracy, terrorism, capital and violence crimes, illegal environmental activism, theft and vandalism. Then the panelists were asked to discuss and comment on the presented arguments.

The most interesting topics from the first round were summarized in the second round, and the panelists were asked to give their opinions and arguments on them. The second round also contained questions about risk management methods for each threat. The last round gave the panelists an opportunity to comment on the summaries of the previous rounds and define maritime security measures. Thus, the results of the first and second rounds were further clarified and supported.

3.3 Workshops

The material was also collected by arranging workshops: one workshop in Kotka and two workshops in Helsinki. In addition, a meeting with Russian maritime security experts was held in October 2012 during Gulf of Finland Maritime Assembly with the purpose to discuss security threats and their risk control options.

A workshop on the identification of threats was held in Kotka in May, 2012. The list of security threats and preliminary outcomes of the expert interviews related to security threats were presented. The experts estimated if any of the threat scenarios was relevant in the Baltic Sea area. The main purpose of the workshop was to discuss and analyze the information obtained by the interviews. In addition, the future measures of the project were discussed.

A workshop on the identification and evaluation of the threats was held in Helsinki in August, 2012. The aim of the workshop was to examine the maritime security factors and policies that have a primary impact to security. In addition, factors of maritime security were determined, and the primary impact to the security was examined.

A workshop on maritime security risk management was held in Helsinki in June, 2013. The workshop was related to the security aspects of WP3, and a few threats to violate the security were highlighted. Four aspects were selected for more detailed discussion: terrorism, piracy, smuggling of drugs and weapons and illegal fishing. Also, VTT's security threat analysis model for the MIMIC project was presented.

4 MAPPING OF MARITIME SECURITY THREATS

The mapping of maritime security threats in the Baltic Sea region was based on the analysis of the results of the interviews of Finnish maritime authorities and experts, web-based survey for the authorities and experts for Baltic Sea area, Delphi study for the Finnish maritime authorities and experts and the information collected from workshops. The results from the interviews and survey were examined in the previous report “Maritime Security and safety threats – Study in the Baltic Area” by Fransas, Nieminen, Salokorpi, 2013. Some main results of the Delphi study are presented in the following subchapter and the discussion about all the results is placed after it.

4.1 Results of the Delphi study

The phases of Delphi study are presented in chapter 3.1. The Delphi study focused on the following threat categories: destruction of the marine environment, illegal fishing, smuggling, stowaways, piracy, terrorism, environmental activism, vandalism and theft.

Illegal discharges were considered to be a problem to some extent, for example the temptation to release small amount of oily waters is high, although the surveillance has reduced emissions. The probability to be caught and penalized is still minor. Also, the understanding of the influences of discharges to environment, especially to the Baltic Sea, has not yet reached everyone. According to panelists, the security measures for illegal discharges include authority surveillance, rules and regulations, contracts, inspections, sanctions and affordable and efficient waste management. Matters related to illegal fishing raised different opinions, but still it was estimated to be a minor problem in the Baltic Sea area. Some of the panelists thought that illegal fishing is a problem, and others commented that although it happens the impacts are rather insignificant. Better surveillance, regulations, sanctions, accounting controls and general awareness were considered the security measures for illegal fishing.

Most panelists estimated that drugs are smuggled in the Baltic Sea. Cargo vessels, especially container ships, are the most probable mode for illegal transport, but drugs are also transported, especially in the Schengen area, through internal passenger ship traffic. The significance of

this phenomenon to maritime safety and security was estimated low due to the fact that often seafarers are not aware they have contraband cargo. The security measures for drug smuggling are surveillance, intelligence, national and international co-operation between authorities, regulations and the means to address the problem in the country of origin.

According to some panelists, small amounts of weapons are smuggled in the Baltic Sea, and the free movement of goods inside the Schengen area increases the amount of weapon smuggling. Panelists thought that although human trafficking is very rare in the Baltic Sea region it can be classified as a problem. However, the connection of human trafficking to the seafaring is unclear. Land borders were considered to be the most common route. The most essential security measures to these threats are surveillance and intelligence.

Currently, the panelists did not consider piracy to be highly probable. The Baltic Sea is a closed and restricted area, which is why piracy is difficult to organize in the area. There are no triggers to encourage piracy because the overall conditions are good. The most essential security measures for piracy are security plans, international co-operation, training and authorities' preparedness. A terroristic attack in the Baltic Sea was considered possible, even if currently unlikely, although the small size of the area and careful surveillance make terroristic actions difficult. Security plans, international co-operation, the exchange of information, training, preparedness, ISPS code, regulations, the increase of penalty scale, as well as removal of conditions for terrorism are the risk management methods against terrorism.

The panelists assessed that violent crimes occur in the Baltic Sea area, especially in passenger ships. It is also clear that theft, particularly small-scale, and vandalism occurs in the Baltic Sea, especially in passenger ships. The impacts on the maritime safety and security were considered low, mostly affecting the public image of sea travel. The most essential security measure against vandalism is surveillance. The security measures against thefts include surveillance, ships' and shipping companies' security plans, vigilance, increase of penalty scale, ISPS code, increasing the risk of being caught, and restrictions on the availability of alcohol.

The common opinion among the panelists was that illegal environmental activism occurs in the Baltic Sea area but no violence has been used. Environmental activism mainly causes problems such as public image issues, delays, and extra costs. The company policies affect the probability of being targeted by activists. Surveillance, such as access control and following the online discussions, were mentioned as the most essential security measures against illegal environment activism.

4.2 Discussion of the study results

All the collected results can be processed in different ways depending on the viewpoint. The phenomenon this study is focused on has been examined mainly from the maritime point of view, but in some cases also from the perspective of society and business. The phenomenon can also be approached with focus on the realization of the threat; the severity of consequences, safety of life (human casualties), operative activities (business interruption, delays) and economic losses.

The maritime security threats can be classified from the perspective of seafaring as presented in table below: a) direct attack causing harm to the ship/port/infra, b) exploitation of the ship/supply chain, c) harm to the marine environment, d) harm to passenger ships, e) seafarer’s involvement, and f) other cases. Based on the received material, Table 1 below presents some viewpoints on seafaring with a focus on security threats.

Table 1 Classification of security threats from the perspective of seafaring

Direct attack harm to the ship/port/infra:	Exploiting the ship/supply chain:
<ul style="list-style-type: none"> • Terrorism • Piracy • Illegal environmental activism • Vandalism and theft 	<ul style="list-style-type: none"> • Smuggling of drugs, weapons, smuggling of goods • Human smuggling and trafficking
Harm to the marine environment:	In particular, the problems of passenger ships:
<ul style="list-style-type: none"> • Illegal fishing • Illegal emissions • Illegal exploitation of natural resources 	<ul style="list-style-type: none"> • Crimes of violence • Thefts and vandalism
Seafarers involved:	Other:
<ul style="list-style-type: none"> • Illegal emissions • Violations of marine rules • The potential threat in all categories 	<ul style="list-style-type: none"> • Economic crimes • Unlabeled weapons and / or unreported transport • Unmarked transport of chemicals • CBRN-threats

One of the main aims of MIMIC study was to classify the maritime security threats and to study their occurrence in the Baltic Sea region. Figure 1 below illustrates the occurrence of maritime security threats in the Baltic Sea region. The threats which occur in the Baltic Sea region have been presented inside the blue ellipse. The prevalence of these threats varies.

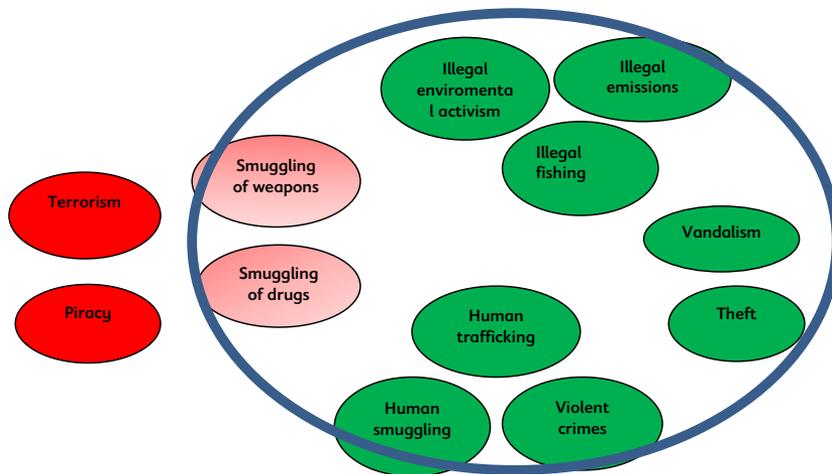


Figure 1 Occurrence of security threats in the Baltic Sea region

The collected security material suggested that the most serious threats are terroristic attacks and piracy (red ellipses in Figure 1), but their occurrence at the Baltic Sea has been low. Some kind of an attack, however, might be potential in the future, particularly if the attacks conducted by individuals are taken into account because the detection of preparation for such an attack is very difficult. Currently, there is no piracy at the Baltic Sea, and the probability of piracy was estimated lower than the probability of a terroristic attack. The Baltic Sea is quite a stable and well-monitored area.

Other serious problem is the smuggling of drugs and weapons (colored in pink in Figure 1). It seems that smuggling of weapons is more systematic than has been assumed, but during the research it was noticed that the collection of data on this issue is quite difficult because civilians have no exact information and the authorities can only reveal what is considered public information. Therefore, the findings remained somewhat unclear. However, the free movement and open sea connections to the Baltic Sea states could increase the smuggling of weapons and also make drug smuggling (or the smuggling of any other substance) easier. Drugs are mostly smuggled in containers and Ro-Ro and Ro-Pax-vessels where the smuggled goods are easier to hide. Increasingly, they are also smuggled inside the luggage of an individual passenger. The smuggling of drugs is not a problem in seafaring unless it is not revealed during the transportation or at the port. However, from society's point of view, the smuggling of drugs is a more serious problem.

The mapping of maritime security threats is a general overview of the categories of threats that might occur in the Baltic Sea area. According to the collected material, the most significant threats are smuggling of drugs and weapons and human trafficking, but also attacks conducted by individuals. Human trafficking has no clear connection to seafaring and it is not a problem from the maritime point of view. The smuggling of goods generally does no harm to seafaring unless it is revealed during the transportation. More extensive summaries and analyses of security threats are made in a technical paper of the MIMIC WP 3 study that will not be published in any open source.

5 ANALYSIS MODEL FOR MIMIC

Security threats can be estimated by the theoretical definition model which was developed for the purposes of MIMIC. Mainly, the model was meant to serve as a tool for strategic decision making, but if the model is used for more operational purposes, the user can define the model specifics and further develop the model.

The analysis model for MIMIC can be used as a security risk management method covering the proactive and reactive actions and also the actions taken after a threat has occurred. The security threat analysis model can also be understood as a visualization of security risk assessment.

5.1 Planning of analysis model

The planning of a security threat analysis model for MIMIC was started by determining methods for a security threat analysis and conducting literature survey (carried out by Technical Research Centre of Finland (VTT)). After that, VTT conducted the report on “Security threat analysis model for MIMIC project”. VTT was chosen as the provider of the literature review and security threat analysis model due to its long experience in research projects and maritime security matters.

First of all, the MIMIC security threat analysis model is a theoretical definition model covering the field of research on different levels. It was created with an emphasis on an extensive overview of the definitions used in relation to maritime security threats. Because it is an overview of related analysis models, it requires operationalization. In this case, the operationalization is the conversion of definitions into measurable form implemented by computer software (Bayesian network model).

5.2 Structure of model

The security threat analysis model is *a generic framework* for security threat analysis that structures the analysis process into three interconnected main modules or phases comprising 1. threat credibility module, 2. exploitation/vulnerability module, and 3. consequence module. The threat analysis framework is shown in figure 2. (Tuominen, 2013, 7.)

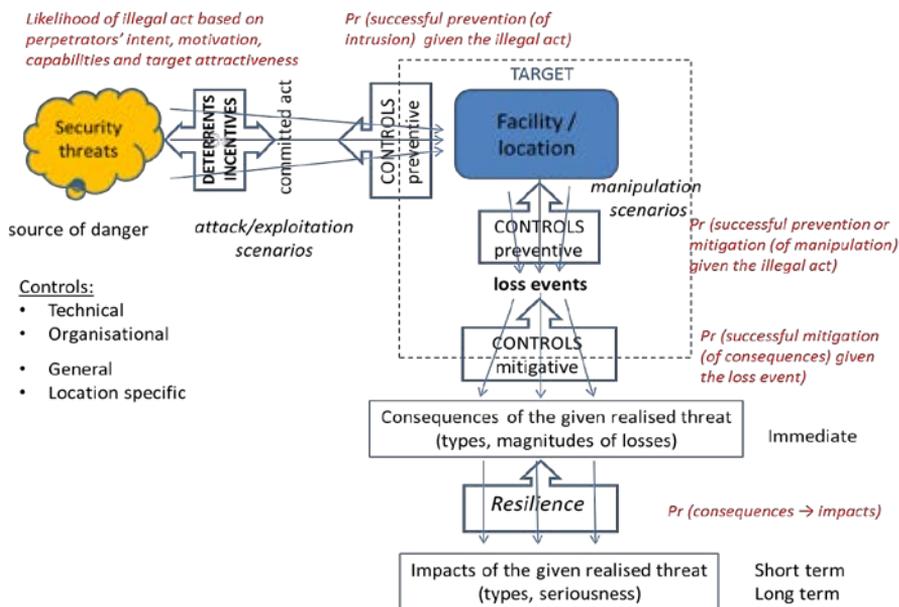


Figure 2 Threat analysis framework model developed for MIMIC (Tuominen, 2013, 7)

The security threat analysis model for the MIMIC -project is applicable to security threat analysis from the viewpoint of individual facilities or locations (i.e. vessels and port terminals) as well as from the perspective of oil transport or marine transports in general (Tuominen, 2013, 6). Thus, the model can be applied by single users (different authorities, ports, shipping companies etc.) or it can be used on a very general level for the estimation of maritime security threats.

Figure 3 describes the process and the interconnections between the threat credibility model, exploitation / vulnerability model and consequence model.

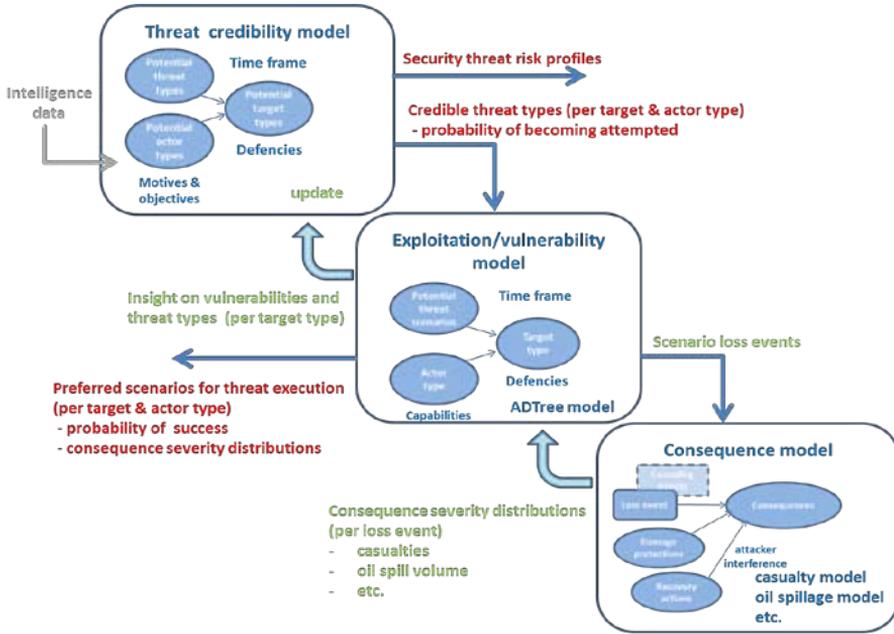


Figure 3 Threat analysis process based on the threat analysis model for MIMIC (Tuominen, 2013, 28)

This study is concentrated on “Threat credibility model” part of the security threat analysis process. The variables of “Threat credibility model” are demonstrated in Figure 4, and the figure also illustrates the dependencies and relations between different variables.

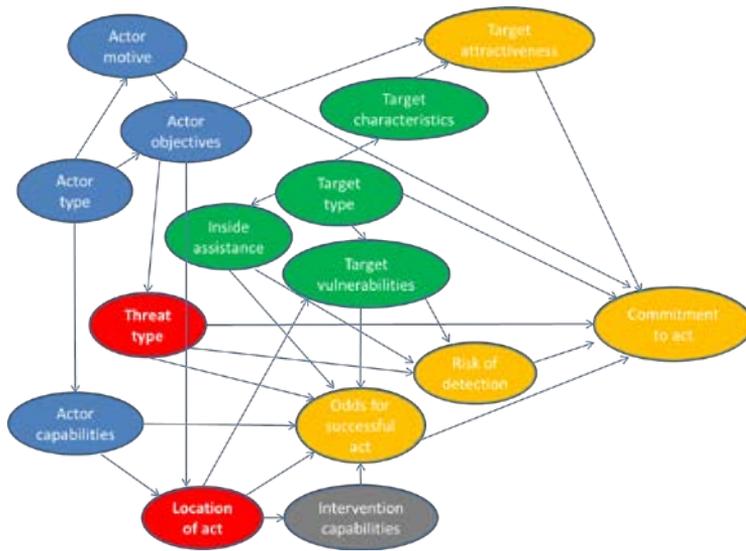


Figure 4 “Threat credibility model” for assessing the likelihood of realization of the different threat types on different target types in marine transport (Tuominen, 2013, 14)

The usability of security threat analysis model on a general level has been discussed in workshops with the developer of MIMIC model (representative of VTT), and representatives of Kymenlaakso University of Applied Sciences and University of Helsinki. In the workshops, it was discussed how to operationalize the model and examined the states, dependencies and relations of variables. The security threat analysis model for MIMIC has been presented to the authorities and the potential users of the model.

6 MARITIME SECURITY MEASURES

This chapter examines the maritime security measures in general. The selected security measures are based on the results of the Delphi study including the most essential methods for managing the security issues in the Baltic Sea according to the authorities and experts involved in the Delphi study.

6.1 National and international maritime security cooperation and awareness

Security cooperation is guided by international commitments and national legislation. (Valtonen 2010, 147). When facing the increased threat of, for example, piracy, terrorism, illicit trade and illegitimate exploitation of marine resources, the international co-operation has become an essential step. In a domestic setting, different national agencies are mostly responsible for security awareness.

According to Peer (2012,5): *“To achieve awareness at a regional or even global level, many of the functions currently managed by individual nations will have to be undertaken by organizations which will enable all stakeholders to operate more efficiently and effective together”*. In order to better understand maritime security co-operation and awareness (MSCA), activities can be organized in layers, figure 5.

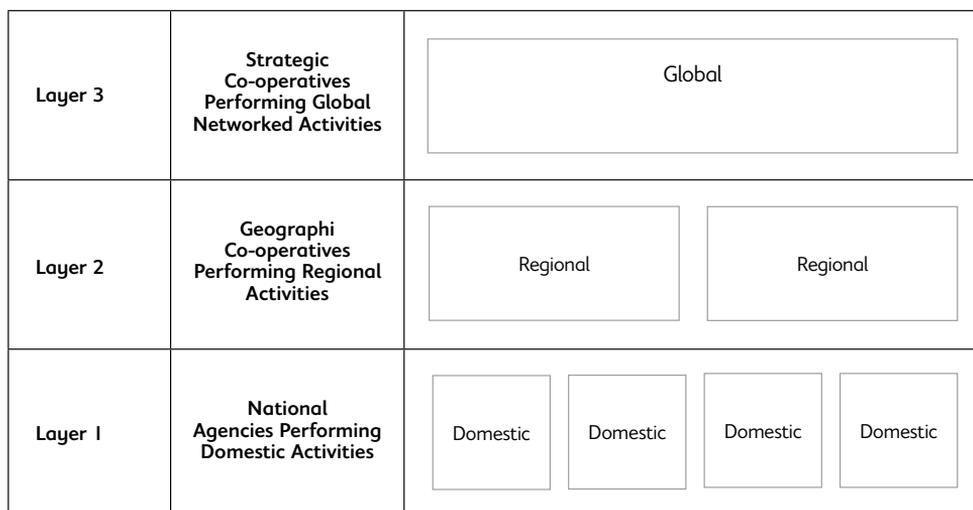


Figure 5 The Layers of Maritime Cooperation and Awareness (Modified from Peer 2012, 6)

The process of achieving Maritime Domain Awareness (MDA) includes: “1. collection of information, 2. fusion of information from different resources, 3. analysis through the evaluation and interpretation of information, and 4. dissemination of information to decision makers, with the goal of identifying risks and threats before they turn into catastrophic events.” (U.S. Government Accountability Office 2010, 113.)

6.2 Maritime surveillance conducted by authorities

European Union (2010,7) defines maritime surveillance as follows: “*Maritime Surveillance is the effective understanding of all activities carried out at sea that could impact the security, safety, economy, or environment of the European Union and its Member States*“. Furthermore, House of Commons Defense Committee (2012, 11) states that: “*Maritime surveillance is a layered capability collecting information at a variety of levels: over a very wide domain using assets such as satellites; at a more precise theatre level using assets such as maritime patrol aircraft and ships; or in a specific area using assets such as unmanned aerial vehicles and helicopters*”.

The national level comprises national actors and also the information on sea areas produced by the authorities of neighboring countries. In Finland, maritime surveillance is based on a comprehensive control system which provides a national perspective of the sea. (Valtioneuvoston kanslia 2009, 49).

Maritime surveillance aims to prevent violations of the territorial integrity. Surveillance and security of territorial integrity requires the identification and monitoring of the sea areas, in other words maritime awareness. Maritime awareness creates requirements for the prevention of violations and other offences related to the territorial surveillance and, if necessary, secure the launching of control operations related to territorial integrity and sea rescue. (Säkkinen 2011, 12.)

6.3 ISPS Code

International Code for the Security of Ships and Port Facilities (ISPS) was prepared in New York 11 September 2001. The code is an amendment to the 1974 SOLAS Convention, and IMO adopted the code in December 2002. The code is used to create an international framework of cooperation in order to detect security threats and take measures to prevent security incidents in ships or port facilities used in international transport. (Söderblom 2004.)

The ISPS Code is a two -part document describing the minimum requirements for the security of ships and ports. Part A provides mandatory requirements and Part B provides guidance and recommendations for implementation. However, many authorities (EU, USA) require that the security plans are made in accordance with Part B. (Jones 2006, 113.) The ISPS code applies to passenger ships and high-speed passenger craft, cargo ships of 500GTs and above and mobile offshore drilling units. The code also applies to port facilities serving such ships engaged in international voyages. (McNicholas 2008, 93.)

The code contains regulations for maritime security situations. Maritime security measures are the measures that the government, port operators, shipping companies and other interested parties must take when examining, evaluating, and preventing activities caused by a variety of criminals targeting vessels and port facilities operating in international traffic. The code is designed to detect and assess situations that threaten security. It is therefore possible to take preventive measures in situations that threaten the international ship traffic and port facilities. In addition, the code contains regulations and details the responsibilities of concerned parties. According to the code's regulations, information concerning the security is integrated and should be available to all parties. The code is used to create requirements for different levels of security. (Söderblom 2004.)

Security level has an essential significance in the ISPS code (Söderblom 2004).The Maritime Security Measures identify three levels of risk. These risk levels are used internationally (IMO 2012, 34-35):

“Security level 1 means the level for which minimum appropriate protective security measures shall be implemented at all times.

Security level 2 means the level for which appropriate additional protective security measures shall be maintained for a period of time as a result of the heightened risk of a security incident.

Security level 3 means that level which further specific protective security measures shall be maintained for a limited period of time when security incident is probable or imminent although it may not be possible to identify a specific target.”

6.4 The security of supply chain

The security of supply chain is the physical flow and information flow between the origin and the customers. There is no benefit to the supply chain if certain links or stakeholders operate more

efficiently than others; the total performance from the origin to the end user is the relevant matter. Each link within a supply chain is dependent on the previous links. (Banomyong 2005, 4.)

The security of the supply chain is managed with The US container security initiative (CSI), The US Customs Initiative on Supply-Chain Security or Customs' Trade Partnership against Terrorism (C-TPAT) and EU Authorized Economic Operator (AEO).

The US container security initiative (CSI) consists of the following four core elements (Banomyong 2005, 9):

1. *“to establish security criteria to identify high risk containers;*
2. *to pre-screen those ocean going containers identified as high risk before they arrive at US ports;*
3. *to use advance technology to quickly pre-screen high-risk containers;*
4. *to develop the use of smart and secure ocean going containers.”*

The US Customs Initiative on Supply-Chain Security or Customs' Trade Partnership against Terrorism (C-TPAT) has been implemented in many countries due to the fact that several US importers and their suppliers have been “advised” to join this initiative. (Banomyong 2005, 10.)

“C-TPAT recognizes that customs can provide the highest level of security only through close cooperation with the ultimate owners of the supply chain, importers, carriers, brokers, warehouse operators and manufacturers. Through this initiative, Customs is asking business to ensure the integrity of their security practices and communicate their security guidelines to their business partners within the supply chain.” (Hauser, Graham, Koerner, & Davis. 2004, 23.)

C-TPAT is the inspiration for the AEO system. AEO's main purpose is to create secure transport chains as part of the fight against terrorism and to facilitate international trade. An economic operator may voluntarily apply for AEO status in order to gain simplified customs procedures and / or facilitations of customs control inspections. There are three types of AEO: 1) Customs Simplifications, 2) Security and safety, and 3) both Customs Simplifications and Security and Safety. (Kuronen & Tapaninen 2007, 31.)

C-TPAT and AEO have certain differences. AEO combines the security with the use of simplified procedures of customs clearance. In addition, the AEO applies to both exports and imports, while the C-TPAT only covers the export of the United States. C-TPAT is best suited for large companies, but AEO is intended for small and medium-sized enterprises. (Kuronen & Tapaninen 2007, 38.)

6.5 Automatic Identification System (AIS)

It can be said that the availability of information about a ship to other ships and the coastal authorities increases maritime security. Automatic identification system (AIS) automatically

provides information about a ship to other ships and to the coastal authorities. The requirement became effective for all ships by 31 December 2004. AIS must be maintained in operation at all times unless international agreements, rules or standards require the protection of navigational information. (IMO 2013.)

The regulation requires that AIS shall (IMO 2013):

- *“provide information - including the ship’s identity, type, position, course, speed, navigational status and other safety-related information - automatically to appropriately equipped shore stations, other ships and aircraft;*
- *receive automatically such information from similarly fitted ships; monitor and track ships;*
- *exchange data with shore-based facilities.”*

Long Range Identification and Tracking system (LRIT). Regulation concerning Long Range Identification and Tracking system (LRIT) entered into force at the beginning of 2008 with the purpose to improve maritime security. In the LRIT system, the contracting parties share information about the vessels moving in the high seas for search and rescue purposes. LRIT is included in SOLAS Chapter V (Safety of Navigation). In the LRIT, vessels are required to report their identity, location, and the time and date of the location. LRIT system is not connected to the vessel’s automatic identification systems (AIS systems). The information provided by LRIT is more confidential than that of AIS and it is distributed only to the receivers specified in the regulation. In addition, national governments can only receive LRIT information from the vessels that are more than 1000 nautical miles from the coast of the country. (Kuronen & Tapaninen 2007, 29.)

The main purpose of LRIT is to enable a contracting government to obtain ship identity and location information in sufficient time to evaluate the security risk posed by a ship off its coast and to respond, if necessary, to reduce any risks. It is mandatory to have LRIT in all passenger ships, high speed craft, mobile offshore drilling units and cargo ships of over 300 gross tonnes. (EMSA 2013.)

6.6 Maritime education

Maritime education can be considered an important security measure because the education addresses, for example, the key issues of the ISPS Code and security management methods. Also, the awareness and skills related to safety and security matters that are adopted during the years of training are a necessary basis when managing security risks.

Nowadays, maritime education and training has been expanded to cover all onboard duties, and working in the field requires the completion of maritime education. The qualifications and degrees earned in vocational schools and universities form the basis for the occupational education and training. As for higher education, universities and colleges are parallel but have different profiles and functions. (Anttila & Salmenhaara 2010, 27.)

Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention) has had its own impact on the educational legislation, structure of degree and training programs, content of education, equipment and tools for the education, teachers and other staff of educational institutions, as well as co-operation and networks. The convention defines the mandatory minimum requirements in the field, such as the health condition requirements for the professionals working in the field, the amount of sea service, and the standards for certificates and qualifications. (Anttila & Salmenhaara 2010, 30.)

7 DISCUSSION AND CONCLUSIONS

The main aim of the study was to reflect what actions are needed for the development of comprehensive safety and security in the maritime sector when security threats are also taken into account in risk management. First, some general aspects on maritime security were discussed. Next, the collection of material and definition of maritime security threats were presented. Finally, the most important maritime security measures were presented.

7.1 Discussions

Material for this study was collected by means of theme interviews, a web-based survey, Delphi study and workshops. This study is a review of security issues in the Baltic Sea region. In particular, the study is focused on Finland. For this study, a list of threats was formed, and the threats were examined on a general level. MIMIC WP3 is concentrated on the study of security threats mainly at a strategic level.

The topic of the study was diverse and multidimensional, so only a general overview of the threat categories was presented. Therefore, more research is needed in the future. During the study, it was noticed that the security issues are quite challenging to study because the threats are somewhat sensitive and often not openly discussed. In some cases emotional attitude diminished the importance of expert opinions. Discussion on security issues demands an atmosphere of trust and openness. It would also be easier to conduct further studies with the help of a person who has to classified data.

One way to promote trust is to allow the respondents comment anonymously. Delphi method has such a feature, and this was one reason the method was employed in this study. To some extent, the method produced desired results if they are compared with the findings of the interviews. The main findings are the same, but for example, the likelihood of terrorism was clearly higher (possible) than in the interviews (unlikely). We assume that it was easier to increase the estimation when answering anonymously. On the other hand, anonymity also increased the number of emotive comments. An opportunity to comment freely and at the same time unload feelings is a good way to approach a difficult issue, but the process should continue until a common understanding of the issue is reached. However, we did not fully reach this goal because of the very

busy schedule of the respondents. It is understandable that there are only a few experts in this field, and naturally they have only limited time for this kind of studies.

Another aim of this MIMIC WP 3 study was to analyze collected threats by using the model developed in the project (see Chapter 5). The method and theory used in the model development were similar to those used in other parts of the MIMIC project (Bayesian Belief Network). The model could be then connected with the other models. The main aim of the security threats analyzing model was to conduct analysis of all the identified threats at the same time and estimate the likelihood for example of an illegal action that might cause an oil spill. The aim and also the developed model present a very ambitious task. However, there is still much development work to do and we would like to proceed carefully. Resources reserved for the MIMIC project were insufficient when compared to the scope of the study, and that is why we could not analyze the collected threats as systematically as we expected. The model development should be continued by a future study.

7.1 Conclusions

The results of the study show that: the smuggling of weapons and drugs, thefts, vandalism, human trafficking and smuggling of humans, violent crimes, illegal fishing, illegal discharges and illegal environmental activism occur in the Baltic Sea region.

According to the results of the study, it can be said that growing problems in the Baltic Sea are smuggling of drugs, smuggling of weapons and human trafficking. The probability of terrorism is very low, but attacks conducted by some unorganized individuals should be considered possible. Drugs move around the Baltic Sea. Most drugs are transported in containers, Ro-Ro and Ropax vessels because contraband cargo is easier to hide onboard these vessels than for example onboard tankers. Due to the free movement of goods inside the Schengen area, the transportation of drugs in smaller packages with passengers is becoming a growing trend. Generally, smuggling is not a problem to seafaring unless it remains uncovered during the transportation. Drug smuggling is a major problem for the society.

According to the authorities, weapons are smuggled on a larger scale and more systematically than previously assumed. Human trafficking occurs in the Baltic Sea and apparently it is a greater problem than is publicly admitted. However, human trafficking is not a problem from maritime point of view. Victims of trafficking are most likely transported with the status of legal passengers, and the truth is revealed only at the destination. The coordination of standards and practices, as well as the creation of trusted networks is required to improve and increase situational awareness.

Maritime security measures have been examined with authorities and maritime experts. It is obvious that management methods for security threats vary slightly depending on the threat type. However, surveillance was mentioned by the experts as being the most essential maritime security measure. Cooperation between maritime law enforcement authorities of the Baltic States is considered good, and there is no need to significantly change security measures. However, according to the discussions with authorities, the unattainability of necessary information is one of the most significant security threats. Not all information is available for every authority, and

the collection of information is challenging. This challenge should be the first to be tackled in the near future. In addition, closer cooperation and clarification of task sharing could improve the preparedness.

In conclusion, networking between different stakeholders is very important when improving maritime security management. All in all, situational awareness and collaboration both nationally and internationally can be regarded as good maritime security measures. The Baltic Sea is a politically stable area, and unless this changes there are no triggers for security threats. However, the future is difficult to predict, and no threat should be omitted from the preparations plans.

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APPENDIXES

Appendix I. Introduction of MIMIC project

Minimizing risks of maritime oil transport by holistic safety strategies” (MIMIC)

The partners of the project are Kotka Maritime Research Centre, Centre for Maritime Studies at the University of Turku, Kymenlaakso University of Applied Sciences, Aalto University, University of Helsinki, Tallinn University of Technology, University of Tartu, Swedish Meteorological and Hydrological Institute and Finnish Environment Institute. The cost estimate for MIMIC project is approximately 2 million euros, and its duration is from May 2011 to the end of 2013. The project is funded by the European Union and it has been approved to be one of the EU flag ship projects. The financing comes from the European Regional Development Fund, The Central Baltic INTERREG IV A Programme 2007-2013, Centre for Economic Development, Transport and the Environment of Southwest Finland (VARELY), the City of Kotka, Kotka-Hamina Regional Development Company (Cursor Oy), Kymenlaakso University of Applied Sciences, Finnish Environment Institute, University of Tartu, Tallinn University of Technology, and Swedish Meteorological and Hydrological Institute.

Appendix 2. “Threat credibility model” variables (Tuominen, 2013)



Variable name	Description	States
Actor type	Categories characterizing potential performer(s) of illegal acts. (Distribution of potential performer(s) of illegal acts into distinctive categories)	Insider (employee, contractor) Vessel Individual Criminal Vandal/saboteur Activist/activist group Org crime group/network Terrorist group/network
Actor motive(s)	Foreseen main motive(s) active in an actor type category to enter into illegal acts in the given context	None Social Economical Political Ideological Ethnical/religious Frustration/anger Peer credit
Actor objectives	Foreseen aim(s) in an actor type category regarding the outcomes of the illegal acts	Human casualties Material damage, destruction Disruption of operation Financial loss Intimidation, fear Publicity Influence in public opinion Political influence/change Peer respect Financial benefit Social change Infiltration of arms/operatives
Actor capabilities	Foreseen level of actor skills and possession of (or access to) means/ resources needed for execution of the threat types	Low Moderate Good

Threat type	General categories of potential intentional harmful acts or illegal exploitations applicable to marine transportation	Destruction/damaging Sabotage/disrupting of oper. Hijacking/seizure of vessel Cyber attack Piracy Theft (things, info) Violence on persons Kidnapping Intentional pollution Smuggling of goods/persons ...
Target type	Categories of potential targets for the intentional harmful acts or illegal exploitations in the maritime context	Oil terminal Cargo terminal Passenger terminal Passage infra/equipment Crude oil tanker Oil product tanker Chemical tanker Bulk carrier General cargo vessel Container vessel Passenger vessel/ferry ...
Target characteristics	Characteristics of potential target systems that determine the value of a target for the potential actors; e.g. monetary value, passenger capacity, damage/loss potential, public interest, etc.)	
Target vulnerabilities	Description of the various protective measures/controls implemented in the potential target systems and evaluation of their expected status and effectiveness in preventing or mitigating the act.	
Intervention capabilities	Foreseen capability of external actors (authorities, other vessels) for timely intervention to prevent/terminate or mitigate the act.	No/Poor Moderate Good
Location	Location for the illegal act against the selected target	Port/terminal Coastal fairway Open sea
Inside assistance	If the actor has somebody inside the target system/organisation providing information or assisting in the illegal act.	Yes No
Target attractiveness	How well target characteristics correspond to actor objectives.	No/Low Moderate High

Odds for success	Likelihood perceived by the actor for successfully executing an illegal act related to the threat type.	Minimal Reasonable Fair Maximal
Risk of detection	Likelihood perceived by the actor of getting caught, read-handed or afterwards, of the illegal act .	No/Low Moderate High
Commitment to act	Actor is committed/ready to execute the illegal act related to the threat type i in the target type j	Yes (j,i) No

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